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Tubal Sterilization and Vasectomy

> *"You are wise to think about the health of your family and how you can provide for the children you already have," the doctor told the couple. "I can tell you that either the man or the woman can be sterilized. Both ways are very effective and neither the man nor the woman suffers an ill effect on health or on the ability to enjoy sexual relations." The doctor explained both tubal ligation and vasectomy. Then he left the couple for a little while so they could discuss the decision between themselves. Because the woman was pregnant, the couple decided she would have a tubal ligation just after her child was delivered.*

In 1990, more than 170 million couples of childbearing age in developing countries used voluntary surgical contraception (VSC), making it the most widely used method of family planning in the world.[31,32] The popularity of sterilization reflects its effectiveness, safety, and high client satisfaction. In African nations, however, use of tubal sterilization remains low and use of vasectomy is under 1%.

Many factors have contributed to the improved safety of VSC over the past 20 years: improved anesthetic methods, better surgical techniques and asepsis, increased use of local anesthesia with light sedation, improved training of personnel, and better selection and monitoring of patients. Vasectomy and female sterilization are compa-

rable in effectiveness, and both are permanent. If both were equally acceptable to a couple, vasectomy would be medically preferred, because it is a more minor procedure, more effective in the long run, and less costly.

OVERCOMING BARRIERS

Access to VSC services depends on the attitude of a particular country's government toward population growth, the legality of sterilization, and the requirements or conditions that must be met for an individual (especially a woman) to undergo a sterilization procedure. Some of these conditions have been established to make sterilization safer, such as requiring that sterilization be performed by a physician. Some conditions are aimed at preventing a couple from regretting their decision to have sterilization, such as requiring that couples be a minimum age or have a minimum number of living children. Some countries require approval of a committee.

Cultural conditions also influence the use of VSC. For example, 23 sub-Saharan countries require the husband's approval for female sterilization, and seven countries require the wife's approval for vasectomy. Niger is unique in that, in addition to spousal consent, a woman must also have the approval of her parents and her husband's parents.[31]

Misconceptions and cultural and religious barriers prevent many men from being sterilized. Education and counseling are important ways of helping men to understand the advantages of vasectomy. For example, questions commonly asked by men include:

Question: *Is vasectomy the same as castration?*

Answer: No. Vasectomy blocks the pathway that sperm use to get into your semen. Your testicles are not removed or damaged in any way (find the words in the client's local language that best explain what is happening technically).

Question: *How will vasectomy affect my manhood?*

Answer: Vasectomy does not affect your manhood. Your penis will still become erect like before. You will still produce semen and ejaculate as before. You will not lose your desire for sex.

Question: *Will I still enjoy sex?*

Answer: The operation should have no effect on your ability to enjoy sex. It merely prevents sperm from getting into the semen.

Question: *What happens to the sperm?*

Answer: They die in the blocked tube and the body absorbs them.

Question: *Are there any long-lasting effects from vasectomy?*

Answer: There are no proven long-lasting effects that have been seen in vasectomized men. Some report that their wives enjoy sex more because they are no longer worried about getting pregnant.

COUNSELING FOR MALE AND FEMALE STERILIZATION

Sterilization is a permanent method of contraception; once the surgery is performed, the individual cannot simply change his or her mind. Few male or female VSC reversals are performed in Africa. A number of circumstances, usually hard to predict, may lead users to regret that the sterilization procedure was performed: losing their children, getting divorced or remarried, or wishing for additional children.

Make certain the individual correctly understands the procedure and its consequences. Check your local family planning or maternal and child health (MCH) service policies and standards for guidelines on counseling. Or use the following outline, which spells BRAIDED:

B = Benefits. Explain that a single decision to undergo sterilization provides a permanent, highly effective, and "natural" method of birth control.

R = Risks. Explain that infection, bleeding, and complications of anesthesia may occur, and that there is still a slight chance of future pregnancy. Inform the client that procedures to reverse sterilization are expensive, involve major surgery and risk, are not available to everyone, and are often unsuccessful. Warn the client that sterilization does *not* protect against sexually transmitted infections (STIs), including the human immunodeficiency virus (HIV). Instruct clients to wear condoms to protect themselves against HIV or other STIs.

A = Alternatives. Discuss alternative reversible contraceptive methods and also sterilization for the partner.

I = Inquiries. Encourage the client to ask questions; discuss myths and correct misinformation.

D = Decision to change. The client must be free to decide against surgical contraception without loss of any medical or financial benefits.

E = Explanation. Explain in detail the entire procedure and its possible side effects. Emphasize the permanence of the procedure. Explain what is known about effects on future health and sexual response. Inform the clients of any costs they will bear. Give the client instructions for before and after the operation.

D = Documentation. Make notes of the method and timing of surgical contraception as well as any complications, including their management and outcome.

POSTPARTUM COUNSELING

The client must be given sufficient time to make a thoughtful, informed decision about a permanent method of contraception, especially if the client is a woman considering immediate postpartum or postabortion (spontaneous or induced) sterilization. Whenever possible, the woman should have decided she wants a permanent method well before delivery or a pregnancy-related procedure. Her decision may be unduly influenced by the emotional and physical stress produced by the pregnancy. Clients who are sterilized in the immediate

postpartum or postabortion period are more likely to regret having had the procedure.[43] These times are often ones of stress for a woman. At the appropriate time, service providers can help by exploring a couple's attitudes and mentioning all the options. Make very certain the couple understands that the method is permanent.

After delivery or abortion, wait to counsel the woman until she is free of the immediate stresses and not under the influence of sedatives. If the woman clearly desires no more children, she may be a suitable candidate for VSC. Where appropriate and possible, include the husband in these discussions. Medical problems such as eclampsia, postpartum hemorrhage, or intrapartum or postpartum infection require postponing the VSC procedure until the woman is well enough to undergo surgery.

Staff should be skilled in explaining and providing alternative postpartum methods, such as an intrauterine device (IUD) or Norplant, that may be inserted immediately following abortion or childbirth. Women should feel no pressure to decide on sterilization because of the unavailability of alternative methods or lack of skill to provide them. Moreover, delayed VSC services should be available so that if the client is uncertain or there is a medical contraindication, the procedure can be comfortably scheduled at 4 weeks or later after delivery.

If the procedure is delayed beyond 4 weeks after delivery and the woman is not breastfeeding, advise her to use an effective contraceptive method until sterilization.

Informed Consent

Informed consent to undergo a surgical procedure is the voluntary decision made by a person who has been fully informed about the procedure and its consequences. Provide the information in a language the client can understand and include all the information listed in the local family planning or MCH policies and standards as well as in the BRAIDED mnemonic. (See the section on Counseling for Male and Female Sterilization.)

The client, along with the surgeon or an authorized representative, must always sign or mark the informed consent form. The authorized representative may be the person with the primary responsibility for counseling the client. Illiterate clients should mark the informed consent form with a thumbprint or "X"; a witness chosen by the client must also sign or mark the form. If possible, the witness should be of the same sex as the client.

VOLUNTARY SURGICAL CONTRACEPTION FOR WOMEN

MECHANISM OF ACTION

Sterilization for women involves mechanically blocking the fallopian tubes to prevent the sperm from reaching the egg.

EFFECTIVENESS

When standard techniques are used, sterilization has a lower risk of pregnancy than do most temporary contraceptive methods. Pregnancy rates for sterilization are similar to rates for some of the long-acting methods, such as implants, injections, and IUDs. Most studies of the common occlusion techniques—the Pomeroy and Parkland techniques, rings, clips, and electrocoagulation—have reported pregnancy rates of less than 1%.[22,38] These rates, however, reflect only the first year or two after sterilization. In a recent study of more than 10,000 women, cumulative pregnancy rates exceeded 1% after 5 years and reached 1.8% after 10 years.[25] Sterilization failures may occur for any of five reasons:[35]

1. The woman may be pregnant at the time of sterilization. This situation may be avoided if the sterilization is performed within the first 10 days of the menstrual cycle, if the patient uses an effective contraceptive until after the sterilization procedure, or if the patient abstains from intercourse following her last menses prior to sterilization.

2. Surgical error accounts for 30% to 50% of failures.[23] These errors can be reduced through better training of surgeons, taking good care of surgical instruments, and accurately identifying fallopian tubes.
3. Equipment failure can occur when laparoscopic methods are used.
4. Fistula formation occurs most commonly with the electrocoagulation method (this method was generally not used in Africa at the time this book was written).
5. Spontaneous re-anastomosis is related to the method of occlusion. Carefully using rings, clips, or standard ligation methods (Pomeroy or Parkland) will decrease the prevalence of these problems.

The 10-year follow-up of the unipolar and bipolar sterilization cases in the U.S. Collaborative Review of Sterilization (CREST) study found higher pregnancy rates with spring clip application and bipolar cautery than with unipolar cautery.[25] The higher pregnancy rates appeared to be related to surgeon training and to technical problems with the instrumentation, such as incorrect wattage.[19,35] For well-trained surgeons, differences in effectiveness rates between occlusion techniques will probably not be important. However, some techniques vary in effectiveness depending upon when the woman is sterilized and which surgical approach is used. (See Occlusion Techniques under sections Providing Postpartum and Postabortion Surgical Contraception and Sterilization Interval Surgical.)

Advantages and Indications

There are several advantages to female sterilization:

- The procedure is permanent.
- The pregnancy rate is low.
- The method is cost effective (when cost is spread over the remaining years of fertility).
- The patient has nothing to buy or remember.

- No significant long-term side effects occur.
- The partner does not need to cooperate.
- Lovemaking need not be interrupted.

Female sterilization is a safe operative procedure. In developing countries, reported fatality rates are about 4.7 per 100,000.[18] In contrast, the maternal mortality rate in such countries is 630 deaths per 100,000 live births.[31] Sterilization by minilaparotomy can be performed safely during the immediate postpartum period or in association with pregnancy termination, provided that the clients' medical status is adequately assessed.

Female sterilization is ideal for those persons who are certain they wish no further children and who need a reliable contraceptive method. It is also indicated for those in whom subsequent pregnancy may have an adverse effect on the woman's health.

Disadvantages and Cautions

Female sterilization has several disadvantages as well:

- The procedure should be considered *permanent*.
- Techniques to reverse the sterilization are difficult and expensive.
- It does not protect against STIs.
- Sterilization procedures are technically difficult.
- The operative procedure requires a surgeon, an operating room (aseptic conditions), trained assistants, medications, and surgical equipment.
- The initial expense is high.
- The risk of ectopic pregnancy is high when sterilization fails.

PROVIDING INTERVAL STERILIZATION

The timing of female sterilization, whether pregnancy-related or not, is very important in choosing the surgical approach, method of occlusion, use of counseling, staff and facilities, and organization of patient flow. Surgical techniques for female sterilization include (1) ligation, in which a thread-like material is tied around the fallopian tubes, (2) mechanical occlusion with clips or rings to close the tubes, and (3) electrocoagulation (see Figure 21:1). The fallopian tubes are usually approached through the abdomen via a minilaparotomy incision or laparoscopy. A surgeon may also perform female sterilization at the time of a cesarean section or other abdominal surgery. Surgeons have generally abandoned an approach through the vagina via a colpotomy because of the increased risk of infection and pregnancy.

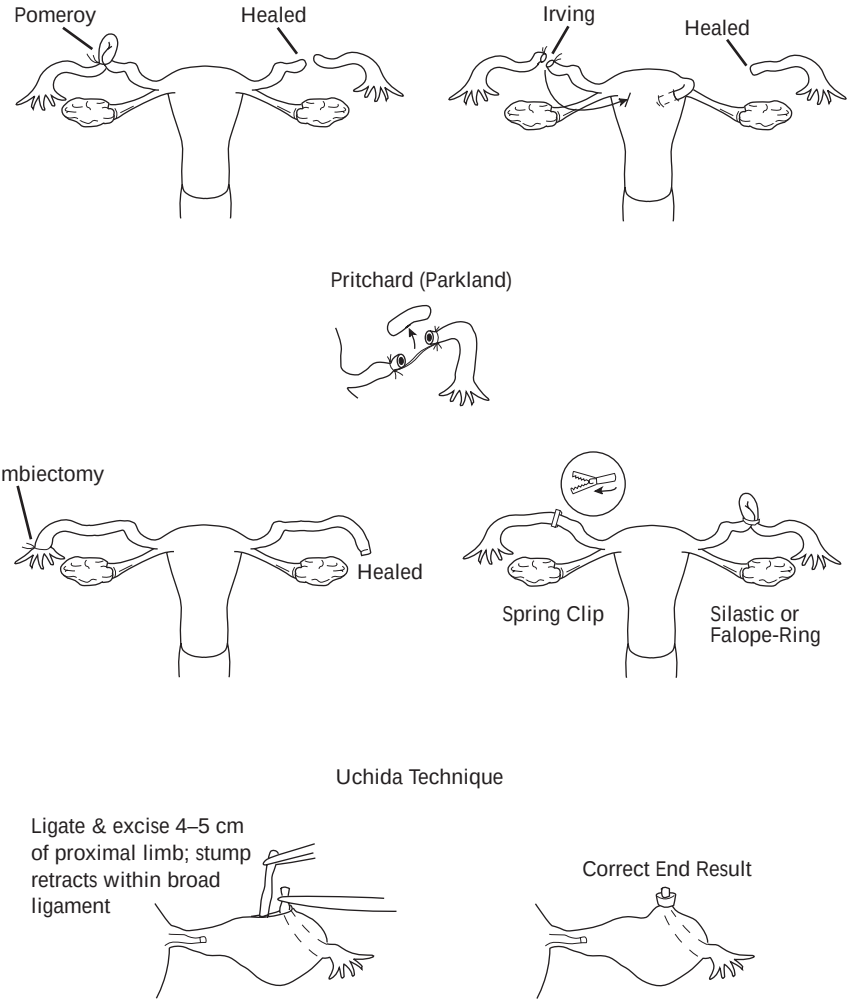
In the preoperative assessment, make sure the patient has been appropriately counseled and has consented to surgical sterilization. Ask about pelvic disease, previous abdominal or pelvic surgery, diabetes mellitus, heart or lung disease, bleeding problems, allergies, and recent infections. Determine the date of the last menstrual period. Make certain the woman is not pregnant. When sterilization is performed postpartum or after an abortion, make certain the client has no pregnancy-related problems and that she is not anemic. Order appropriate laboratory studies, which usually will include at least a hemoglobin measurement. Assess the patient's heart, lungs, abdomen, and her general condition. Perform a careful pelvic examination. Pay special attention to uterine position and mobility and whether the patient might have pelvic infection or masses.

Training manuals specific for Africa have been developed by the Association for Voluntary Surgical Contraception (AVSC) and are available upon request.[3]

Suprapubic Minilaparotomy

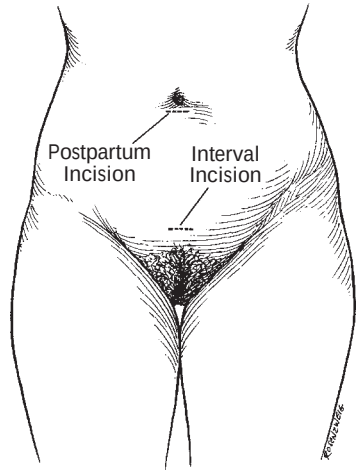
Suprapubic minilaparotomy for "interval sterilization" (at 4 or more weeks after delivery) is performed when the uterus is fully involuted. The surgeon makes an abdominal incision 2 to 5 cm in length, just at the pubic hairline (see Figure 21:2). When healed, the incision

Figure 21:1 Tubal sterilization techniques



lies within the hairline and is not visible. Using the minilaparotomy technique may be difficult if the woman is obese, if the uterus is immobile, or if the tubes have adhesions from infection or previous surgery. The pelvic organs must be mobile during the surgery so that the tubes can be moved into the incision site.

Figure 21:2 Incision site: postpartum and interval minilaparotomy



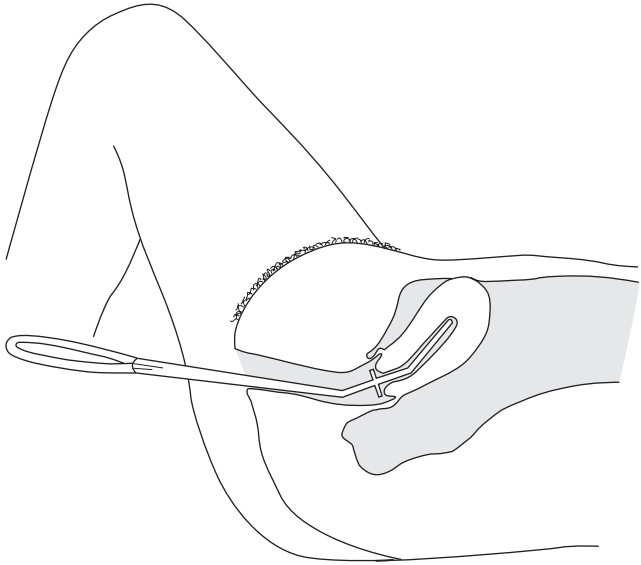
Source: Stewart et al. (1988)

Anesthesia. Light sedation using a local anesthesia can be given preoperatively to infiltrate layer by layer of tissue. When using local anesthesia, continue communicating with the woman during the procedure to enhance the analgesic effect, reassure her, and, when necessary, elicit her cooperation.

Procedure. The bladder should be emptied immediately before the operation. The surgical procedure is generally performed with the woman in a supine or a semilithotomy position. If the uterus is not already anteverted, elevate the uterus by hand or with a uterine manipulator (elevator) (see Figure 21:3).

In general, place the incision approximately 1 cm below the site at which the elevated uterine fundus hits the abdominal wall. If the incision is placed too high, the tubes will be difficult to reach. If it is placed too low, the bladder may be incised. Because anatomy varies from patient to patient, take great care in entering the abdomen. Locate the fimbria to confirm that you have found the fallopian tube and not the round ligament. If needed, use a tubal hook or small Babcock forceps to lift the fallopian tube from the abdomen. Surgical manipulation should be slow, gentle, and sensitive to the patient's complaints and responses. Avoid unnecessary trauma or manipulation.

Figure 21:3 A metal elevator raises the uterus and moves it from side to side so that the uterus and tubes will be closer to the incision



Source: Stewart et al. (1988)

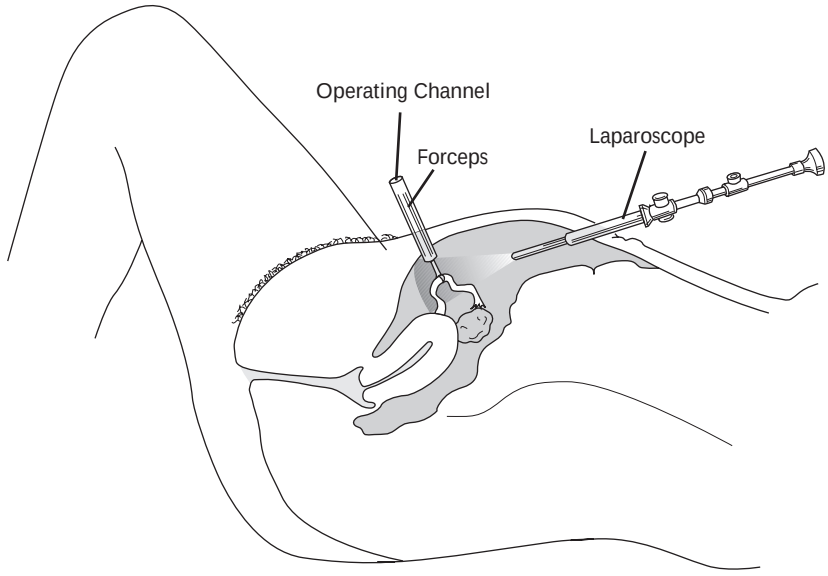
Occlusion techniques. The Pomeroy and Parkland techniques, Silastic rings, the Filshie clip, or spring clips can be used (the last two with special applicators). Fimbriectomy and the Madlener procedures have been associated with higher pregnancy rates and have no advantages over the Pomeroy and Parkland techniques for routine cases. The Pomeroy technique is the most widely used in Africa.

Closing. Use careful aseptic technique and obtain good hemostasis before closing the abdominal wound in layers. Growing evidence indicates it is unnecessary to suture the peritoneal layer, because small peritoneal defects will heal without adhesions.[44] This rule applies as well to postpartum subumbilical minilaparotomy.

Laparoscopy

The laparoscopic approach is used to place rings (bands), apply clips, or electrocoagulate the oviducts. A laparoscopy may be performed using either a single- or double-puncture technique. The second puncture is used to manipulate the organs and occlude the tubes (see Figure 21:4). With single-puncture laparoscopy, the operating instrument is passed through the laparoscope.

Figure 21:4 Laparoscopy



Laparoscopy is less painful than a minilaparotomy, has a lower rate of complications and a shorter operative and recovery time, and leaves only a small scar (the same equipment and skills can be used for endoscopic diagnostic procedures).

The disadvantages of laparoscopic sterilization include the need for a provider with specialized training, equipment that is more difficult to maintain than minilaparoscopy equipment, and a specially equipped operating room. Laparoscopic sterilization is not recommended for the immediate postpartum period.

Anesthesia. Laparoscopic sterilizations can be performed using local or general anesthesia. Local anesthesia with light sedation is usually adequate and offers safety advantages over general anesthesia, which can lead to compromised cardiorespiratory function.[26]

Procedure. Clean the perineal area, vagina, and cervix and scrub the abdominal site with special emphasis on thoroughly cleaning the navel. The cervix may be stabilized with a laparoscopic instrument.

The insufflation needle should have a blunt obturator (as does the Verress needle). Verify correct placement by aspiration, hanging drop, or pressure test.[44] Keep equipment in good working order. Keep the trocar sharp.

After making a small subumbilical incision, place upward traction on the abdomen to insert the Verress needle for insufflation. Advance the needle toward the pelvis and away from the great blood vessels. Place the patient in the Trendelenburg position and insufflate 1 to 3 liters of gas (the minimum needed for good visualization), nitrous oxide (N_2O), carbon dioxide (CO2), or room air. Withdraw the needle and insert the trocar, advancing it toward the pelvis and away from the great vessels as the abdominal wall is firmly elevated. Remove the trocar from its sleeve (cannula) and insert the laparoscope.

In double-puncture laparoscopy, the second puncture is made under direct vision through the laparoscope in the abdomen. In single-puncture laparoscopy, the operating instruments are inserted through the operating channel of the laparoscope to grasp and occlude the oviducts.

It is also possible to perform "open laparoscopy," in which the peritoneal cavity is opened under direct vision, an approach similar to that used in subumbilical minilaparotomy. A cannula is then placed and stabilized for insertion of the laparoscope. This method avoids blindly entering the abdomen with sharp instruments.[12] However, general use of open laparoscopy has gained little support because it takes longer than traditional laparoscopy and it remains to be shown that it is safer.

Occlusion techniques. Silastic bands, unipolar electrocoagulation, and Filshie clips appear to have similar short-term effectiveness rates when correctly applied, but the ectopic pregnancy rate appears to be higher with electrocoagulation (bipolar and unipolar) than with the bands or clips.[39]

Clips are placed on the isthmic portion of the tube at 1 to 2 cm from the uterus. Silastic rings (bands) are placed 3 cm from the uterus. Because the spring clip has a lower force of compression than the Filshie clip, it requires precise placement at a 90-degree angle across the tube, with the isthmic portion of the tube positioned at the hinged part of the jaws to avoid failures. Electrocoagulation is applied in the midportion of the tube, away from other structures.[48] (See Figure 21:5.)

Figure 21:5 A laparoscopy instrument grasps one tube in preparation for coagulation or application of a ring or clip

Source: Stewart et al. (1988)

Closing. After both tubes are occluded, inspect the pelvic organs to ensure that no injury or bleeding has occurred. Under direct vision, remove the second puncture instruments, carefully expel all the gas, and remove the laparoscope and the cannula. When removing the cannula after all gas has been expelled, reinsert the laparoscope to the end of the cannula to prevent omentum or bowel from herniating into the abdominal wall defects as the cannula is removed.[44] Close the incision with sutures.

Vaginal Approach

The fallopian tubes can be reached and the pelvic organs directly visualized through a colpotomy, an incision high in the vagina (posterior to the cervix), or by using an endoscopic instrument called a culdoscope. However, vaginal approaches are less safe and less effective than minilaparotomy or laparoscopic approaches. Infection is more common, and the techniques are generally more difficult to learn and perform. Thus, the vaginal approach should be used only by a skilled surgeon familiar with the culdoscope.[44]

Transcervical Approach

Most of the hysteroscopic techniques for injecting occlusive materials into the fallopian tubes are still experimental. These techniques are difficult to learn, equipment is expensive, and the success rates when they are used for sterilization have generally been disappointing.

Also considered experimental are nonsurgical sterilization techniques using a chemical or other material to occlude the tubes through the cervix. Several agents, including quinacrine, methyl cyanocrylate, and phenol, have been used with varying success. Delivery systems are still being perfected to obtain higher levels of effectiveness.

Quinacrine pellets inserted high in the intrauterine cavity may cause nonsurgical sterilization. This method can be performed in any clinical setting equipped and staffed to insert an IUD. In one study, 73% of women had both tubes occluded after two insertions of quinacrine pellets; both tubes were occluded in 94% after three insertions.[6] Researchers in Vietnam found this method to be safe and effective for female sterilization,[13] but many professionals believe that current information does not warrant its use except in experimental conditions. In a significant number of clients, this method fails to occlude the fallopian tubes. However, some groups are encouraging the acceptance of the transcervical approach because it is simple, nonsurgical, and can be performed on an outpatient basis.

Hysterectomy

Hysterectomy, whether performed through the vagina or abdomen, carries a much higher risk of serious complications than other sterilization procedures. Thus it should only be performed for a gynecological disease or condition that justifies a hysterectomy, not solely for terminating fertility.

Providing Postpartum and Postabortion Surgical Contraception

Immediate postpartum VSC services can be an integral part of any maternity service. Postpartum VSC can be performed in a simple procedure room, a delivery suite, or an operating theater.

In many countries, the immediate postpartum period (within 48 hours of delivery) is the most common time to perform female sterilization. Postpartum VSC offers greater convenience to the client and provider, lower costs, greater ease of surgery, and more efficient use of health resources. Generally, the woman's health status can be assessed from the delivery and prenatal records.

Subumbilical Minilaparotomy

A woman who undergoes subumbilical minilaparotomy need not stay longer than she would for a normal delivery (24 hours or less in many hospitals). If a minilaparotomy is performed 10 or more hours after delivery, postpartum hemorrhage is unlikely to occur, because the uterus will be contracted and less likely to relax and, therefore, bleed. In addition, the baby can be observed and assessed more thoroughly prior to discharge.[29] (See Suprapubic Minilaparotomy for more on preoperative assessment.)

Anesthesia. Local anesthesia with light sedation is frequently sufficient, because several of the more painful aspects of minilaparotomy are reduced: the incision is smaller, and intra-abdominal manipulation of the tubes is less extensive. The patient lies quietly in the supine position, and there is no need for instruments in the vagina.

Procedure. For the first 2 days after delivery, the fundus of the uterus and fallopian tubes lie high in the abdomen. A small (1.5 to 3 cm) incision just below the umbilicus allows the surgeon to reach the tubes. The tubes are usually easier to reach if both the incision and the postpartum uterus are aligned with each other.

When a minilaparotomy is not feasible, a laparotomy (defined as an incision longer than 5 cm) may be performed, usually with general, spinal, or epidural anesthesia. Laparotomy incisions cause more complications, and the associated anesthesia methods increase the risk and prolong recovery times. (The laparoscope is not used in the immediate postpartum period because of the risk of injury to the large, vascular uterus. Laparoscopic occlusion methods are not appropriate because the oviducts are edematous and vascular and thus larger.)

Occlusion techniques. Figure 21:1 illustrates several occlusion techniques. The Pomeroy technique, using plain catgut, is an effective, safe approach in the immediate postpartum period. In the midportion of the fallopian tube, create a loop of tube. Close the loop by ligating with plain catgut suture material. Cut the loop to separate the tube.

The Parkland technique avoids bringing the cut ends together and preserves more of the tube. Perforate the mesosalpinx in an avascular area. Ligate the tube in two places with chromic one-zero catgut, and excise the intervening segment of tube.[23,29]

Use of the Hulka clip in the postpartum period has been shown to compare favorably with the modified Pomeroy tubal ligation because of its simplicity and greater potential reversibility.[21] The Filshie clip and the spring clip are not designed for use postpartum and are, therefore, generally not recommended for postpartum sterilization.[16] Electrocoagulation is also not recommended, because it is usually delivered via laparoscopy and appears to be associated with an increased risk of fistula formation and ectopic pregnancy.

Fimbriectomy, sometimes performed because the ampullar and fimbrial portions of the tubes are more accessible than the isthmic and ampullar portions, has fallen from favor. It has high pregnancy rates and a higher frequency of postoperative complications. Fimbriectomy is also less reversible and removes more tissue.

Cesarean Section

Tubal occlusion can be easily accomplished during cesarean section. However, because of the greater risks involved with cesarean section, health care providers should be discouraged from performing a cesarean section rather than attempting a vaginal delivery just because tubal ligation is planned.

The Pomeroy technique has a slightly higher pregnancy rate when performed at the time of a cesarean section than an interval procedure; the lack of surgical skill may be a reason. The Parkland technique is also commonly used during a cesarean section. The Irving technique (which requires a wide surgical exposure for implanting the proximal end of the tube into the uterine wall and is thus possible with cesarean section) is one of the most effective methods of occluding the tubes and is unlikely to permit an ectopic pregnancy.[29]

Postabortion VSC

Tubal occlusion via a minilaparotomy or laparoscopy may be performed immediately after a first-trimester spontaneous or medically induced abortion as long as the patient receives careful counseling. Note that the tubes will be edematous. (See Minilaparotomy Complications and Laparoscopy Complications.)

Occlusion techniques. The Pomeroy or Parkland procedures may be used for occlusion. Silastic rings and spring clips are less likely to fail when used in the postabortion period than when used in the immediate postpartum period.

ANESTHESIA

General anesthesia is usually unnecessary for most female VSC procedures, and its risks far outweigh its benefits. If general anesthesia is used, it must be provided by trained personnel in appropriate settings. A discussion of general anesthesia is beyond the scope of this text.

Local anesthesia with light sedation is the preferred way of providing pain relief. Do not compromise the normal physiological control of vital functions. Avoid high doses of opioid (narcotic) analgesics and benzodiazepine (tranquilizer) sedatives that can compromise ventilation, sometimes dramatically, and may cause cardiovascular depression.

Monitor vital signs regularly both during and after the operation until the patient is fully recovered and alert.

The following is a sample regimen for local anesthesia for minilaparotomy. It is also suitable for laparoscopy with some modifications as noted (doses given are for an average adult body weight of 50 kg).

Premedication

Sedate the patient with 10 mg of diazepam 30 to 60 minutes before the operation. Midazolam, a new short-acting parenteral benzodiazepine that is three to four times more potent than diazepam, may be substituted. Give 2.5 to 3 mg midazolam intramuscularly 1 hour preoperatively or 1 to 2.5 mg intravenously in the operating room. Cost may limit the use of midazolam.

Cautionary notes on the use of narcotics and other analgesics

- Their onset is rapid but not instantaneous
- Therefore, they should be given incrementally (in small repeated doses) while the client is being observed
- Reversal agents (Narcan or other appropriate reversal agents) should be immediately available.

Given in the Operating Room

Atropine. Give 0.4 to 0.6 mg intravenously.

Meperidine (Pethidine). Five 50 mg intravenously. Other opioid analgesics or ketamine can be substituted for meperidine. Comparable doses of analgesia are given in Table 21:1.[44]

Table 21:1 Analgesia substitutes for meperidine

Drug	Intravenous dose	Analgesic duration
meperidine (Pethidine)	50 mg	2-3 hours
fentanyl (Sublimaze)	0.05-0.06 mg	30-60 minutes
pentazocine (Talwin)	15-20 mg*	3-4 hours
butorphanol (Stadol)	1 mg	3-4 hours
ketamine (Ketalar)	25-30 mg*	10-15 minutes

*Short acting: supplemental doses about one-third less than the initial ketamine dose may be given at 10-minute intervals.

Promethazine (Phenergan). Give 25 mg intravenously.

Lidocaine local anesthesia. Infiltrate the skin and subcutaneous tissues with 10 to 15 ml of 1% lidocaine (lignocaine) without epinephrine. After the peritoneal cavity is opened, drip 5 ml of 1% lidocaine onto each tube and the uterus. During laparoscopy this step is optional if the instrument does not permit lidocaine application. During double-puncture laparoscopy, the second site will also be infiltrated. The maximum safe dose of 1% lidocaine (without epinephrine) is 5 mg/kg body weight. For example, for a woman weighing 50 kg the maximum safe dose is 250 mg or 25 ml of 1% lidocaine. If only 2% lidocaine is available, dilute it to 1% with 0.9% sodium chloride only so that you can better obtain adequate volume for local infiltration and avoid exceeding the safe dose. Some surgeons use sodium bicarbonate (1 cc of 8.4% sodium bicarbonate [standard vial percentage] with 25 cc of 1% lidocaine) to decrease the burning sensation caused by the anesthesia infiltrating into the subcutaneous space.

Managing Problems and Follow-up

Its low rate of complications (0.4% to 1%) makes female sterilization quite desirable. Complications include wound infections, hematoma, perforation of the uterus with the elevating instrument, bladder injury, and sterilization failure. Most of these complications

can be prevented by careful screening, using local anesthesia with sedation, careful monitoring of vital signs, asepsis, and careful surgical technique. The seriousness of complications can often be minimized if they are recognized early and managed aggressively.

Anesthesia Complications

Anesthesia-related complications can be aggravated if the abdomen is filled with gas or is in the Trendelenburg position, especially if general anesthesia is used. Most complications arising from anesthesia occur acutely.

Surgical Complications

Because the abdominal wall is thin at the umbilicus, proceed cautiously when dissecting and entering the peritoneal cavity to avoid cutting the intestine. Handle the tubes gently to avoid profuse bleeding from the engorged postpartum vessels. Postoperative hemorrhage can occur if ligatures around the tubes are not secure enough to prevent slipping. Reduce the risk of infections by screening clients preoperatively and by avoiding surgery on patients who have had prolonged rupture of membranes with evidence of current infections (with fever).

Prophylactic antibiotics are usually given if the procedure is performed on the third and seventh postpartum day. If the procedure cannot be performed within 7 days after delivery, wait until 4 to 6 weeks postpartum, because the oviducts are usually difficult to reach in the interim.[29,44]

Minilaparotomy Complications

Minilaparotomy procedures may have the following complications:

Wound infection. As with all surgical procedures, careful aseptic technique, proper skin preparation, proper sterilization of instruments and proper technique in the operating room, as well as good postoperative wound care by the client, decrease the risk of wound infections.

Uterine perforation with uterine elevator. Reduce trauma by applying all instruments gently. Carefully determine the position of the uterus before inserting the elevator.

Bladder injury. This common surgical complication occurs because the bladder is close to the lower incision. Dissect carefully and pay attention to landmarks.

Intestinal injury. Take care to identify tissue layers when entering into the abdominal cavity. Serious complications can result from an unrecognized injury.

Laparoscopy Complications

The overall mortality rate for laparoscopic sterilization is 2.9 deaths per 100,000, well below the rate for minilaparotomy of 5.9 deaths per 100,000 procedures.[18] The rate of laparoscopic complications depends heavily on the surgeon's skill. The surgeon needs special training in laparoscopy.

Complications such as mesosalpingeal tears and transection of the tube can occur with ring application, and may require laparotomy to control bleeding. Sometimes an additional ring can be placed on each severed end of the tube to gain hemostasis. Uterine perforation with the uterine elevator can usually be managed conservatively. Injuries to vessels, intestines, or other organs can occur with the insufflation needle or the trocar. Make sure general anesthesia is available to manage the rare complication of severe bleeding from a major vessel.

Bowel burns can occur from electrocoagulation and lead to perforation and peritonitis. Most international agencies discontinued support for electrocoagulation equipment in the early 1980s. Most laparoscopic injuries, however, are not related to the coagulation but to use of the trocar or other surgical instruments.[20]

Long-term Complications

Ectopic pregnancy. *Ectopic pregnancy should be ruled out any time a woman shows signs of pregnancy following tubal occlusion*. Ectopic

pregnancies can occur 6 or more years after sterilization. Ectopic pregnancy is most often related to (1) uteroperitoneal fistula after unipolar electrocoagulation; (2) inadequate coagulation or recanalization after bipolar procedures; or (3) recanalization or fistula formation after the Pomeroy, clip, or ring procedure.[42]

Among nonsterilized women, 0.5% to 1% of pregnancies are ectopic; the comparable percentages for sterilized women range from 4% to 73%, depending on the procedure used.[23] One survey found that 16% of pregnancies following the clip procedure were ectopic; 38% after the ring, 73% after unipolar occlusion, 59% after bipolar occlusion, and 44% after Pomeroy occlusion.[16] Electrocoagulation has a threefold greater incidence of ectopic pregnancy than does the use of the Silastic ring.

Hormonal changes. Several investigators have suggested that serum progesterone may decline following tubal occlusion; other investigators have reached different conclusions. No studies have evaluated pre-sterilization and post-sterilization levels of this hormone.[15] Levels of luteinizing hormone, follicle stimulating hormone, testosterone, and estrogen remain within the normal range.

Menstrual patterns and other changes. A specific, describable pattern of bleeding after sterilization has not been convincingly demonstrated.[28] Further research needs to be conducted.

Psychological problems have not been identified more often in sterilized than in nonsterilized women.[45] A study on the effect of tubal sterilization and vasectomy on female marital sexuality found not only that these procedures have no detrimental long-term effects, but also that sterilized women have intercourse more frequently.[33]

Hysterectomy and dilation and curettage. In one study, women who were sterilized at age 20 to 29 years were at greater long-term risk of having a hysterectomy.[36] Hysterectomies and dilation and curettage (D&C) are sometimes performed because of the mistaken belief that sterilization procedures lead to hormonal and menstrual changes.

SAMPLE INSTRUCTIONS FOR THE FEMALE CLIENT

PREOPERATIVE INSTRUCTIONS

1. You must be certain you understand and desire a permanent method of birth control. You can change your mind at any time before the procedure or can postpone the operation if you need more time to decide.
2. Shower or bathe just before surgery. Carefully clean around the umbilicus (navel) and the pubic hair.
3. Do not eat or drink in the 8 hours before surgery.
4. Have someone be with you on the day of surgery, on your way home, and during the first 24 hours following surgery.
5. Ask questions if you have them.
6. Plan a flexible schedule for the week after the sterilization.
7. Be prepared for pain over the incision and occasional pelvic aching or discomfort. The pain is usually not severe and can be relieved with mild pain medications.
8. Remember that this method of birth control is permanent. Reversal surgery is generally not available in Africa.

POSTOPERATIVE INSTRUCTIONS

1. Rest for 24 hours following surgery. Resume normal activities as you gradually become more comfortable.
2. Avoid intercourse for 1 week and stop if it is uncomfortable.
3. Avoid strenuous lifting for 1 week to allow the incisions to heal.
4. Take 1 or 2 analgesic tablets at 4- to 6-hour intervals if you need them for pain (do not use aspirin as it may promote bleeding).
5. You may bathe 48 hours after surgery but avoid putting tension on the incision and do not rub or irritate the incision for 1 week. Dry the incision site after bathing.

6. Stitches will dissolve and do not require removal. (Note to provider: this instruction must be modified if nonabsorbable sutures, such as silk, are used.)

7. Return to the clinic 1 week after the procedure to make sure healing is normal.

8. At any time in the future, if you think you are pregnant, return to the clinic immediately. Although pregnancy after female surgical contraception is rare, when it does occur, chances are increased that it will be outside the uterus (an ectopic pregnancy). **This is a dangerous, life-threatening condition and must be treated immediately.**

9. Return to the clinic or contact the clinic or doctor promptly if you develop the following signs:

Danger Signs After the Operation

Caution

- Fever (greater than 39° C)
- Dizziness with fainting
- Abdominal pain that is persistent or increasing
- Bleeding or fluid coming from the incision
- Suspicion of pregnancy—you must be seen immediately

10. If you may be at risk for infection with the virus that causes AIDS (human immunodeficiency virus, or HIV) or any other sexually transmitted infection, continue to use condoms.

No matter what other methods of contraception a woman is using, if she is at any risk because her partner tests HIV positive or because she does not know her partner's HIV status, she should be advised to use plastic or latex condoms with every sexual act.
No other contraceptive method besides abstinence provides the same degree of protection.

VOLUNTARY SURGICAL CONTRACEPTION FOR MEN

MECHANISM OF ACTION

Vasectomy blocks the vasa deferentia and thus prevents the passage of sperm into the semen.

EFFECTIVENESS

Although vasectomy is not completely foolproof, it is the most effective contraceptive method for men. The likelihood of operative failure is reduced if the surgeon has performed the procedure frequently.[34] Failure is usually discovered when examination of the semen indicates the presence of sperm more than 4 to 6 weeks after the operation or after 10 to 12 ejaculations.[5]

ADVANTAGES AND INDICATIONS

Vasectomy is a simpler, safer, and less expensive procedure than female surgical contraception. Vasectomy offers several advantages:

- It is highly effective.
- It is very safe.
- The procedure can be performed quickly.
- The effects are permanent.
- The costs are low in the long run.
- Most clients find vasectomy highly acceptable.

DISADVANTAGES AND CAUTIONS

Vasectomy has disadvantages as well:

- It requires surgical training, aseptic conditions, medications, and technical assistance.
- It does not protect against STIs, including HIV.

- Vasectomy is permanent. Although reversal is possible, it is expensive, and requires a highly technical and major surgery for which success cannot be guaranteed.
- About 5% to 10% of patients regret having the procedure.
- Costs are high in the short term.

Short-term disadvantages. Vasectomy is not effective until the ejaculate is free of sperm. Complications such as bleeding or infection, although infrequent, do occur.

Long-term effects. About one-half to two-thirds of men will develop sperm antibodies following vasectomy. However, having these antibodies does not appear to lead to any complications.[22,27] Extensive studies have found no increase in heart disease or other adverse effects following vasectomy.[41]

One study, however, showed a slightly increased risk of cancer in men who had been sterilized for 20 or more years.[8] Other studies have found a weak positive association between vasectomy and prostate cancer;[9,10] epidemiological studies on this relationship have conflicted. The Final Statement from the 1993 Vasectomy and Prostate Cancer Conference concludes: "Because the results of research to date on vasectomy and prostate cancer are inconsistent, and associations that have been found are weak, there is insufficient basis for recommending a change in clinical and public health practice at this time. In light of this:

- Providers should continue to offer vasectomy and to perform the procedure.
- Vasectomy reversal is not warranted to prevent prostate cancer.
- Screening for prostate cancer should not be any different for men who have had a vasectomy than for those who have not."[40]

PROVIDING MALE STERILZATION

Technical guidelines on providing vasectomy services have been developed by the World Health Organization.[46] These guidelines should be followed closely.

Ask the patient about his past illnesses and surgeries, bleeding disorders, allergies (particularly to local anesthetics and pain medications), heart disease, kidney and bladder infection, diabetes, anemia, and STIs. Evaluate his general health condition. Measure his pulse and blood pressure; check for infections in the scrotal or inguinal area and for a hernia or previous surgery in the inguinal area. Evaluate the scrotum for hydrocele, varicocele, and proper descent of the testicles. Examine the scrotal skin and subcutaneous tissues. Laboratory examinations are not routinely performed but should be available.

Vasectomy

Clip the man's hair from his scrotum and around his penis. Just before surgery, wash the area with soap and water. Prepare the scrotum, thighs, and perineum with an effective antiseptic (usually a water-based iodine or 4% chlorhexidine solution). Use sterile technique. Anchor the vasa (two tubular structures, one in each side of the scrotum) with an atraumatic instrument or your fingers. Incise the skin and muscle overlying the vas or open these with the "no scalpel" method (see section on No-Scalpel Vasectomy). Through this small puncture, isolate and occlude the vas (see Figure 21:6). Perform the same procedure on the vas on the other side.

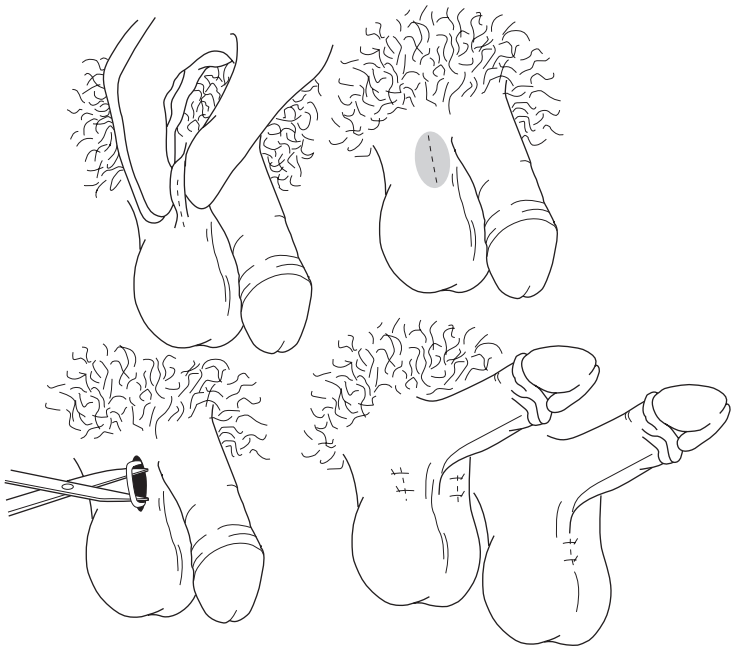
Anesthesia. Infiltrate 1% lidocaine (lignocaine) without epinephrine into the area to be incised and then deeply into the perivasal tissue.

Occlusion techniques. Place a simple ligature using absorbable or nonabsorbable suture on each end of the cut vas. Be careful not to cut through the vas with the suture. A segment of the vas may be removed to obtain greater separation, but this step is not necessary. A fascial barrier may be created between the ends by drawing the sheath over one end and suturing it;[1,44] this technique may decrease the failure rate.

Sperm granulomas occur more often at the cut ends after the ligature technique, possibly contributing to a somewhat higher failure rate than when fulguration is used. A recent modification is to leave the testicular end of the vas open ("open-ended vasectomy") and fulgurate the abdominal end to a depth of 1.5 cm. A fascial barrier may then be interposed. This method appears to reduce the frequency of postoperative congestive epididymitis without increasing the rate of painful sperm granulomas.[1,7,44] Some surgeons report increased failure rates with this approach, but open-ended vasectomy may reduce postoperative complaints. Success rates for reversal may also be higher than when both ends are fulgurated.

Closing. Close the incisions with absorbable suture. Many surgeons use only a single midline puncture and do not suture small skin incisions.[1,14,44] If possible, the patient should rest 15 minutes or longer before he leaves.

Figure 21:6 Sites of vasectomy incisions



Source: Hatcher et al. (1983)

No-Scalpel Vasectomy

A new, refined "no-scalpel" procedure has been introduced and is currently being used in many programs around the world.[2] It is the standard vasectomy technique in China, where more than nine million men have had the procedure,[11] and it is rapidly becoming the procedure of choice in Thailand, India, and Indonesia.[37]

The vasa are approached through a puncture in the scrotum rather than through a scalpel incision,[2] but, thereafter, the surgical procedure is the same as the scalpel method. However, there may be fewer bleeding complications with the no-scalpel method than when the scalpel is used. If these rates are indeed lower, anxiety about producing a postsurgical hematoma might be reduced.[14]

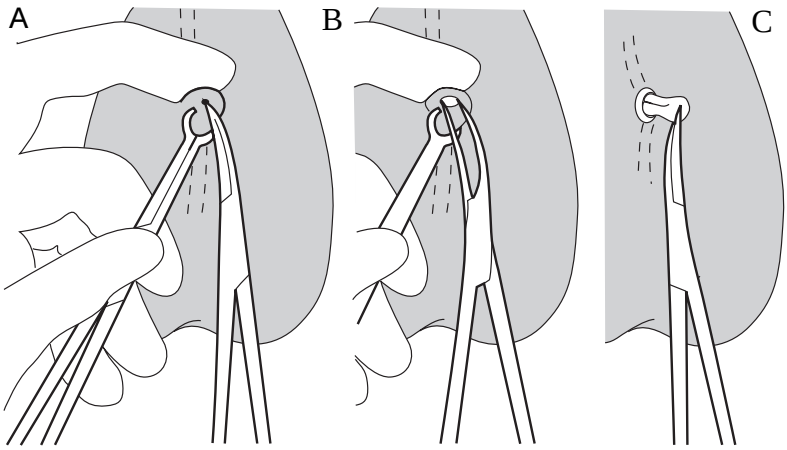
The procedure uses two unique instruments: a specially designed ring forceps and a sharp-tipped dissection forceps. After injecting local anesthetic, encircle and secure the vas with the ring forceps. With the sharp-tipped dissecting forceps, puncture and stretch a small opening in the skin and vas sheath. Lift out the vas and occlude it as you do with other vasectomy techniques. Use the same midline puncture site to deliver and occlude the other vas in an almost bloodless procedure. No sutures are needed to close the small wound (see Figure 21:7).

MANAGING PROBLEMS AND FOLLOW-UP

Mortality is extremely rare (about 1 death per 300,000 procedures) when asepsis and surgical skills meet basic standards.[30] Complications following surgery are also rare (see Table 21:2). Careful surgical technique and keeping the patient from strenuous activity for a day or two reduces bleeding complications. Prevent hematomas by controlling any bleeding during the operation. Manage small, noninfected hematomas with rest and analgesics. Large, painful, or infected hematomas usually require surgical drainage.

Prevent infections by using strict aseptic practices and sterilized equipment. Have the patient keep the incision clean. If an infection does occur, treat it with antibiotics and apply wet heat frequently.

Figure 21:7 "No-scalpel vasectomy." The vas (dotted line) is grasped by special ring forceps and the skin and the vas sheath are pierced by sharp-tipped dissecting forceps (A). The forceps then stretch an opening (B) and the vas is lifted out (C).



Source: Hatcher et al. (1983)

Leakage of sperm from the occluded end of the vas can cause an inflammatory nodule (granuloma) that generally subsides spontaneously, although pain medication may be required. The rare granuloma that increases in size, is painful, and does not recede may be treated surgically. Congestive epididymitis may occur due to back pressure in the occluded vas. With heat treatment and scrotal support, the condition usually subsides in a week.

Table 21:2 Medical complications of vasectomy

Complication	Percentage of procedures (n=24,961)
Hematoma	1.6
Infection	1.5
Epididymitis	1.4
Granuloma	0.3
Failure	0.4

Source: Wortman (1976)

SAMPLE INSTRUCTIONS FOR THE MALE CLIENT

Preoperative Instructions

1. Remember that a vasectomy is permanent. You can change your mind at any time before the operation. Reversal surgery is generally not available in Africa.

2. Before surgery, use scissors to cut hair around the penis and scrotum to approximately 1/4 inch in length.

3. Shower or bathe. Wash your penis and scrotum thoroughly to remove all loose hairs.

4. If possible, have someone go home with you when you have the procedure done. Do not ride a bicycle, walk long distances, or do anything that may rub or put pressure on the scrotum.

Postoperative Instructions

1. Following the surgery, return home and rest for about 2 or 3 days, after which you may resume your normal activities.

2. Avoid strenuous physical exercise for 1 week. Strenuous exercise means hard physical exertion or lifting or straining that could bring pressure to the groin or scrotum.

3. Do not shower or bathe for the first 2 days after the vasectomy.

4. The stitches will dissolve and do not have to be removed. (Note to provider: this instruction must be modified if nonabsorbable skin sutures, such as silk, are used or if no skin sutures are used.)

5. You may resume sexual intercourse after 2 or 3 days if you think it would be comfortable. Remember, you are not sterile immediately. For many men, sperm will not be cleared from the tubes until after about 12 ejaculations. Until then, use condoms or another method of birth control to prevent pregnancy. The best way of finding out whether you are sterile is to have the doctor look at your semen under a microscope after you have ejaculated 12 times.

6. If you have pain or discomfort, simple pain-relieving medications taken every 4 to 6 hours usually give adequate relief. (Note to provider: name and dose should be specified.)

7. It is important for you to know what signs are normal or abnormal following your surgery. You will probably have some pain and swelling in the scrotal region; the scrotum may be somewhat discolored. These effects are normal and should not worry you. Occasionally, blood from a tiny blood vessel may escape into the scrotum at the time of surgery, and bleeding may continue. Notify your clinic if you have any of the following danger signals or if you notice any other unusual body changes. (See Danger Signs below.)

Danger Signs After the Operation

Caution

- Fever
- Bleeding or pus from the site of the incision
- Increasing pain or swelling

For any of these problems, you must return to the clinic for medical care without delay.

8. If you may be at risk for infection with the virus that causes AIDS (the human immunodeficiency virus, or HIV) or any other sexually transmitted infection, continue to use condoms.

REVERSAL OF FEMALE AND MALE STERILIZATION

Voluntary surgical contraception should be considered permanent, but even with careful counseling, some women and men will request reversal following a divorce, a remarriage, or a child's death or if they desire more children. The following points should be emphasized:

- Reversal is generally not available in Africa.
- Reversal requires major surgery and special skills.

- Some clients are not appropriate candidates because of the way the sterilization was performed, because of the client or partner's advanced age, or because of the infertility of the spouse.
- Success cannot be guaranteed, even when the patient is a good candidate and the surgery is performed by an experienced microsurgeon.
- Reversal surgery is very expensive for both male and female clients.

In addition, the candidate should understand that anesthesia and major abdominal or scrotal surgery carry a risk of complications. There is also a risk of ectopic pregnancy after reversal of female sterilization: the rate is about 5% for women who have an electrocoagulation procedure reversed and about 2% for women who have other occlusion techniques reversed.[23]

If the woman wishes to proceed after counseling, a laparoscopy is usually done to determine the condition of the tubes, and infertility tests may be performed for her and her husband. Most surgeons will not operate if less than 4 cm of healthy tube remains.

Success Rates for Reversal of Female Sterilization

With ligation or mechanical occlusion of the tube, careful microsurgical techniques can reverse the sterilization procedure in 50% to 70% of cases. This high success rate, however, reflects reports from experts who have operated on selected patients. Success rates calculated by the number of intrauterine pregnancies after reversal surgery are highest for occlusion techniques that damage the smallest segment of oviduct (see Table 21:3).[23]

Table 21:3 Tubal damage and reversal pregnancy rate by tubal occlusion method

Technique	Tubal damage (cm)	Reversal pregnancy rate (%)
Clip	1	88
Thermal cautery	2	Unknown
Ring	3	75
Pomeroy	3-4	59
Electrocoagulation	3-6	43

Sources: Huber (1988) and Liskin (1985)

Good success rates are generally achieved through the use of microsurgical techniques that require special training and combine several features, including the following:

- Use of magnification (loupe, hood, or operating microscope)
- Accurate alignment of the fallopian tube segments and placement of sutures
- Constant irrigation of tissues to prevent drying
- Use of very fine suture and needles
- Bipolar microsurgical electrocautery to minimize bleeding
- Care to keep foreign materials from being left in the wound

Success Rates for Reversal of Vasectomy

Microsurgical technique is important when restoring continuity of the vas. An operating microscope using higher magnification (25 power) is usually employed. Under these circumstances, reported pregnancy rates range from 16% to 79%, with most rates approaching 50% or above. Higher proportions of men have sperm in the ejaculate, however, with rates ranging from 81% to 98%. Clinicians should not present these high rates as measuring the success of reversal, however, as pregnancy, not the presence of sperm, is the desired outcome.

The pregnancy success rate can depend on several factors, including the skill of the surgeon or microsurgeon. Several factors may reduce chances of success:

- Increased time since the vasectomy was performed[4]
- Presence of antisperm antibodies
- Advanced age of the wife
- Characteristics of the vasectomy that was performed (a long segment of vas removed, it was performed near the epididymis, or cautery was used)

Attempts to develop a plug, valve, or simple reversible vasectomy have not been successful.[22] Men must accept vasectomy as a permanent procedure even though improved microsurgical techniques have increased the chances of restoring fertility.

Policy and Legal Issues

Family planning programs in many African countries are making good progress in providing sterilization. However, appropriate national authorities need to establish clear guidelines that allow the procedures to be available to deserving clients. Policies that include quotas, coercive incentives, "camps," and other similar programmatic concepts are not acceptable in promoting voluntary surgical contraception.

Establishing policies for providing sterilization to retarded women and men and determining the legal status of such procedures remain problems. Health care providers, policy makers, and local leaders should discuss the ethical and legal issues involved in providing voluntary sterilization to those who may not be able to provide informed consent.

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